

CLAIMS:

1. A surgical jig for defining an axis relative to a body part, the jig comprising:
a support;
5 a first guide element having a first guide channel, the first guide element being mounted on the support and being translatable over a first plane; and
a second guide element having a second guide channel, the second guide element being mounted on the support and being translatable over a second plane, the second plane being parallel to the first plane, and wherein the first guide channel and second
10 guide channel between them define a substantially linear jig axis.
2. A jig as claimed in claim 1, and including a drive mechanism operable to move the first guide element and/or to move the second guide element.
- 15 3. A jig as claimed in claim 1 or 2, wherein the support is a frame.
4. A jig as claimed in claim 2, wherein the drive mechanism includes:
first and second carriers bearing the first guide element, disposed parallel to the first plane and perpendicular to each other.
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5. A jig as claimed in claim 4, wherein the drive mechanism includes a motor actuatable to drive the carrier to control the position of the first guide element over the plane.
- 25 6. A jig as claimed in claim 4 or 5, wherein the support includes:
a first pair of opposed sides, each side including a slider and
a second pair of opposed sides, perpendicular to the first pair, and each side including a slider, wherein the first carriage extends between the sliders of the first pair of sides and the second carriage extends between the sliders of the second pair of sides.
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7. An apparatus as claimed in any of claims 4 to 6, wherein the drive mechanism includes:

third and fourth carriers bearing the second guide element, disposed parallel to the second plane and perpendicular to each other.

8. A jig as claimed in claim 7, wherein the drive mechanism includes a motor
5 actuable to drive the carriers to control the position of the second guide element over the plane.
9. A jig as claimed in claim 7, wherein the first pair of opposed sides, each include a further slider and the second pair of opposed sides each include a further slider, and
10 wherein the third carriage extends between the further sliders of the first pair of sides and the fourth carriage extends between the sliders of the second pair of sides.
10. A jig as claimed in any of claims 6 to 10, wherein each slider includes a guide track having a bushing slidably mounted therein and the ends of the carriers are each
15 received in a respective bushing.
11. A jig as claimed in any of claims 4 to 10, wherein each carrier is a lead screw.
12. A jig as claimed in any of claims 4 to 11, wherein each carrier is independently
20 drivable.
13. A jig as claimed in claim 12, and including a separate motor for driving each carrier.
- 25 14. A jig as claimed in claim 13, wherein each motor is an electric motor.
15. A jig as claimed in claim 13 or 14, wherein each motor is a stepper motor.
16. A jig as claimed in any preceding claim and further including a first marker
30 detectable by a tracking system.

17. A jig as claimed in claim 13 , and further including a second marker detectable by a tracking system, the second marker being attached to the second guide element and wherein the first marker is attached to the first guide element.
- 5 18. A jig as claimed in claim 16 and further including an instrument passing through the first guide channel and second guide channel and wherein the first marker is attached to the instrument.
- 10 19. A computer aided surgical system for determining a linear axis relative to a body part, the system comprising:
a jig as claimed in any of claims 16 to 18;
a tracking system for determining the positions of the or each marker and producing marker position data; and
a data processing device configured to operate on the marker position data and
15 data representing the position of a predetermined axis to determine when the jig axis corresponds to the predetermined axis.
20. A method for defining an axis relative to a body part, using a surgical jig having a support, a first guide element having a first guide channel and a second guide element
20 having a second guide channel, comprising:
locating the surgical jig adjacent the body part; and
positioning the first guide at a first position in a first plane and/or positioning the second guide at a second position in a second plane parallel to the first plane, wherein a
jig axis is defined between the first and second guide channels.
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21. A method as claimed in claim 20, and further comprising determining the position of a predetermined axis relative to the body part.
22. A method as claimed in claim 21, and further comprising moving the first and/or
30 second guide elements until the jig axis is substantially co-linear with the predetermined axis.

23. A method as claimed in any of claims 20 to 22, wherein the first guide element and/or second guide element are manually positioned.
24. A method as claimed in any of claims 20 to 23, wherein the first guide element
5 and/or second guide element are automatically positioned.
25. A method as claimed in claim 24, the method further comprising determining the position of the first guide element and the position of the second guide element.
- 10 26. A method as claimed in claim 25, wherein the position of the first guide element and the position of the second guide element is determined by wirelessly tracking the first guide element and the second guide element.
27. A method as claimed in claim 25 or 26, and further comprising determining the
15 position of the jig.
28. A method as claimed in claim 27, wherein the position of the jig is determined by wirelessly tracking the apparatus and wherein the position of the first guide element is determined relative to the position of the jig and the position of the second guide element
20 is determined relative to the position of the jig.
29. A method as claimed in claim 26, and further comprising:
determining the current position of the jig axis based on the current positions of the first and second guide elements;
25 calculating positional data representing the current position of the jig axis relative to the body; and
generating a visual representation of the position of the jig axis relative to the body.
- 30 30. A method as claimed in claim 26, and further comprising:
determining the current position of the jig axis based on the current positions of the first and second guide elements;

generating positional data representing the current position of the jig axis;
determining the position of a pre-determined axis relative to the body; and
generating control signals to drive the jig so as to reduce the separation between
the position of the jig axis and the position of the pre-determined axis.

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31. A method as claimed in claim 30, further comprising generating control signals
to drive the jig until the jig axis and the position of the pre-determined axis are
substantially co-linear.

10 32. Computer program code executable by a data processing device to control a
surgical jig having a support, a first guide element having a first guide channel and a
second guide element having a second guide channel, the first guide channel and the
second guide channel defining between them a jig axis, the computer program code
including instructions to:

15 generate data representing the position of a predetermined axis of a body part;
determine the current positions of the first guide element and the second guide
element;

generate data representing the position of the jig axis defined by a current
position of the first guide element and second guide element; and

20 generating control signals to drive the first and/or second guide elements to
reduce the separation between the jig axis and the predetermined axis.

33. A computer readable medium bearing computer program code as claimed in
claim 32.

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34. A jig as claimed in any of claims 1 to 18, wherein the support includes a
plurality of feet engagable with a surface of the body part.

35. A jig as claimed in claim 34, wherein the plurality of feet can be clamped about
30 the body part to secure the jig to the body part.

36. A jig as claimed in claim 1 or 2, and further comprising:

a first arm by which the first guide element is connected to the support; and
a second arm by which the second guide element is connected to the support.

37. The jig of claim 36, wherein the first and second guide arms are spaced along a
5 longitudinal axis of the support and are each pivotally connected to the support and can
pivot about the longitudinal axis of the support.

38. The jig as claimed in claim 36 or 37, wherein the first and second arms are each
extendable along a longitudinal axis of the arm.

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39. The jig as claimed in any of claims 36 to 38, and further comprising a base
member pivotally attached to the support, and wherein the base member includes a
formation for receiving a fastener to secure the guide to a bone.

15 40. The jig as claimed in claim 39, wherein a part of the support is journalled within
the base member and wherein the base member can clamp around the part of the support
to prevent relative movement between the support and base member when secured to the
bone by the fastener.

20 41. A surgical jig for determining an axis relative to a body part substantially as
hereinbefore described.

42. A method for determining an axis relative to a body part substantially as
hereinbefore described.

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43. A computer assisted surgical system substantially as hereinbefore described.

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